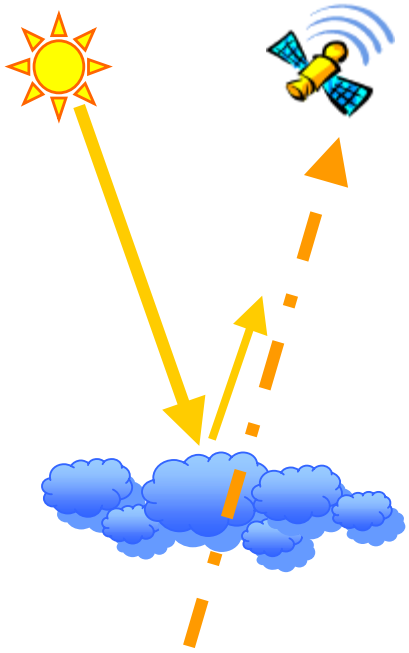
Name(s): _____

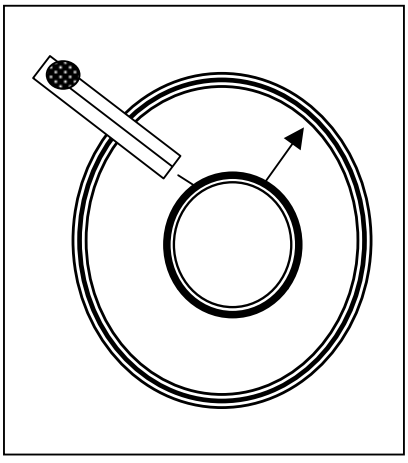
Indirectly Direct Observations



The CERES instrument is a REMOTE SENSING instrument, meaning it obtains information about the clouds without being in contact with them. It collects data *(measurements of reflected radiant energy)* from many orbits around the Earth each day on board satellites like the Terra satellite. Scientists work with data from the CERES instrument (indirect observations) to discover important information about clouds without actually seeing them. Ground truth observations (direct observation) are made by scientists and S'COOL students to validate the data received by satellite.

This activity is a model designed to explore direct and indirect observing.
What is your hypothesis for the question below?

CAN YOU SEE A HIDDEN SHAPE WITHOUT USING YOUR EYES?



1. To do this experiment, your team will need:
- A pie pan with a hidden shape under it (Don't peek!)
- A marble
- A plastic ramp

2. It is your team's mission to discover the shape under the pie pan, but you **cannot**:
- **Peek under the pie pan**
- **Feel under the pie pan**
- **Tilt the pie pan**

3. Use the plastic ramp to roll the marble under the pie pan.

4. Watch what the marble does. Does it hit something and bounce back out? Does it not hit anything? You can use these clues to discover what is hidden under the pie pan.

5. Keep track of what the marble does by drawing its path on top of the pie pan. Remember, you can't actually see what the marble is doing, so you will have to estimate what path it took.

6. If the marble looks like it hit something under the pie pan, draw what it could have bounced off of on top of the pie pan. See the example on the next page.

7. Roll the marble under the pie pan many different times from many different directions.

8.Once all of your team members think they know what shape is hidden under the pie pan, sketch the shape on the paper circle and call someone (teacher or helper) over to test you.
Don't turn the pie pan over until your group has been tested!

Can you see a hidden shape without using your eyes?

Adapted from "The Shape of Things" Jefferson Lab B.E.A.M.S. Program Lessons link to http://education.jlab.org/beamsactivity/index.html